REMARKS/ARGUMENTS

This reply is <u>fully responsive</u> to the Office Action dated 8 SEPTEMBER 2006, and is

5   filed within four - (4) months following the mailing date of the Office Action. The

Commissioner is authorized to treat this response as including a petition to extend the

time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number

of months necessary to make this response timely filed. The method of payment and fees

for petition fee due in connection therewith is enclosed.

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<u>Disclosure/Claims Status Summary:</u>

This application has been carefully reviewed in light of the Office Action of September 8,

2006, wherein:

A. Claims 10, 27, 44, and 61 were objected as being a substantial duplicate of Claims 2,

15   19, 36, and 53 respectively;

B. Claims 1-68 were rejected under 35 U.S.C. § 112 as being indefinite for failing to

particularly point out and distinctly claim the subject matter which applicant regards as

the invention;

C. Claims 1-68 were rejected under 35 U.S.C. § 102(a) as being anticipated by

20   Thompson et al.;

D. Claims 1, 2, 10, 16-19, 27, 33-36, 44, 50-53, 61, 67, and 68 were rejected under 35

U.S.C. § 102(b) as being anticipated by Skaanning et al.; and

E. Claims 3-9, 11-15, 20-26, 28-32, 37-43, 45-49, 54-60, and 62-66 were rejected under

35 U.S.C. § 103(a) as being unpatentable over Skaanning et al., in view of Murphy

25   ("Dynamic Bayesian Networks: Representation, Inference, and Learning," herein referred

to as the "Murphy thesis").

Please note that, in order to facilitate the reading of this Office Action

Response, **all the statements submitted by the Applicants have been**

30   **indented while the Examiner's statements (presented in the Office**

Action dated 8 SEPTEMBER 2006) are not indented.

Duplicate Claim Objections

In page 2 of the current office action, the Examiner objected to Claims 10, 27, 44, and 61 as being a substantial duplicate of Claims 2, 19, 36, and 53 respectively. Specifically, the Examiner stated that should Claims 2, 19, 36, and 53 be found allowable, Claims 10, 27,

5   44, and 61 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. The Examiner further stated that when two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

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Regarding the Duplicate Claim Objections

After carefully reviewing Claims 2, 10, 19, 27, 36, 44, 53, and 61 of the current application, the Applicants concluded that Claims 10, 27, 44, and 61 are indeed a substantial duplicate of Claims 2, 19, 36, and 53,

15   respectively. In accordance, **the Applicants have withdrawn Claims 10, 27, 44, and 61 from consideration.** The amendments to the claims reflecting the withdrawn claims are provided starting on page 2 of this Office Action response.

20   The Applicants respectfully request that the Examiner accept the newly amended set of claims as a replacement for the original set of claims submitted with the patent application. The Applicants believe this new set of amended claims overcomes the objection cited by the Examiner and therefore respectfully request that the Examiner withdraw this objection.

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Claim Rejections - 35 U.S.C. § 112, second paragraph

In page 2 of the current Office Action, the Examiner rejected Claims 1-68 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out

30   and distinctly claim the subject matter which applicant regards as the invention.

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Claims 1-68

Regarding Claims 1 through 68, the Examiner stated that a preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the

5   preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Rohie,* 187 F.2d 150, 152, 88 USPQ 478, 481 (C.C.P.A. 1951). The Examiner further stated that the preamble of the present invention states "A method for automatically generating...," but that the body of the claim does not depend on this.

10

Regarding the rejections of Claims 1-68 under 35 U.S.C. § 112, second paragraph

After reviewing the Examiner's comments, the Specification, and Claims 1-68, the Applicants <u>strongly</u> disagree with the Examiner's statement that "Claims 1-68 do not stand alone to <u>automatically evaluate Bayesian</u>

15   <u>network models for decision support,</u> as stated in the preamble of the present invention."

The Applicants submit that the claims of the present invention, as currently written, disclose process acts, means, or structural

20   **limitations that are able to stand alone on their own, and that these claims do not depend on the preamble for completeness as previously suggested by the Examiner. The Applicants further submit that base Claims 1, 18, 35, and 52 clearly disclose a series of steps or acts that ultimately result on "outputting a representation of the plurality of**

25   **the probabilities of the states of the conclusion nodes," wherein <u>this</u> <u>resulting plurality of probabilities stand alone on their own to</u> <u>evaluate Bayesian network models for decision support</u>.**

As an example of evaluating a Bayesian network model for modeling

30   accuracy, the Applicants submit that <u>a Bayesian network model may be</u> <u>evaluated</u> (or judged for its accuracy on modeling a system and its

corresponding system's failures) <u>solely by the output representation of the</u>

<u>plurality of probabilities of the states of the conclusion nodes</u> which are

<u>obtained after propagating down and up (the causal dependency links) a</u>

<u>set of desired conclusion states</u>, as known by one skilled in the art

5   (referring to the present application pages 10 to 14, and Claims 1, 18, 35,

and 52). The Applicants submit that when the <u>output representation (of</u>

the plurality of probabilities of the states of the conclusion nodes) <u>has a</u>

<u>high probability, then the final states of the conclusion nodes (after</u>

<u>propagating up and down) correspond to the initial pre-set desired</u>

10   <u>conclusion states, and thus the Bayesian network model is automatically</u>

<u>evaluated as an accurate model</u> (referring to Claims 1, 18, 35, and 52). On

the other hand, the Applicants submit that when the <u>output representation</u>

(of the plurality of probabilities of the states of the conclusion nodes) <u>has a</u>

<u>low probability, then the final states of the conclusion nodes (after</u>

15   propagating up and down) <u>do not correspond to the initial pre-set desired</u>

<u>conclusion states, and thus the Bayesian network model failed to properly</u>

<u>model the system and its corresponding system's failures</u>, and the

Bayesian network model is <u>automatically evaluated as an inaccurate</u>

<u>model</u>, as known by one skilled in the art (referring to Claims 1, 18, 35,

20   and 52).

The Applicants further refer the Examiner to pages 11 to 12 of the present

application where it describes that the present invention provides

information that helps in answering the following two questions: "how

25   good is the model as a diagnostic assistant?" and "which nodes/parameters

are responsible for ambiguous or incorrect diagnostic suggestions?" (both

of these questions correspond to the preamble for "automatically

evaluating Bayesian network models for decision support" and the

resulting output as set forth in Claims 1, 18, 35, and 52). Furthermore, the

30   present invention also describes automatically evaluating Bayesian

network models by using an algorithm, which has three basic steps: 1)

Failure propagation; 2) Diagnosis; and 3) Visualization. The Applicants submit that these three steps (failure propagation, diagnosis, and visualization) are fully disclosed in the base Claims 1, 18, 35, and 52, as follows:

5

Failure propagation (referring to pages 11 and 12 of the present application) comprises: selecting one or more specific failures; <u>setting the states of nodes representing failures in the BN (Bayesian Network) to one of the possible defective states</u>; setting the states of the remaining "failure" nodes that are root nodes of the BN to the state "non-defective;" and <u>determining the state of the remaining nodes</u> until the states of all nodes have been determined.

The Applicants submit that "failure propagation" is fully disclosed by Claims 1, 18, 35, and 52, as follows: "receiving a Bayesian Network (BN) model including evidence nodes and conclusion nodes, where the conclusion nodes are linked with the evidence nodes by causal dependency links, and where the evidence nodes have evidence states and the conclusion nodes have conclusion states; <u>setting the states of the conclusion nodes to desired conclusion states</u> and <u>determining, by propagating down the causal dependency links, a corresponding probability of occurrence of evidence states of the evidence nodes and producing, from the probability of occurrence, a plurality of samples of most likely states of the evidence nodes.</u>"

25

Diagnosis (referring to page 12 of the present application) comprises: assuming the states of all the observation nodes to be those determined in the failure propagation step; and <u>computing the posterior probability for all the "failure" nodes</u> (not only the nodes selected as "defective" in the failure propagation step) given the states of the "observation" nodes.

The Applicants submit that "diagnosis" is fully disclosed by Claims 1, 18, 35, and 52, as follows: "setting the states of the evidence nodes to states corresponding to the plurality of samples of the evidence states (most likely states), and propagating the evidence states (corresponding to most likely states) back up the causal dependency links to the conclusion nodes to <u>obtain a plurality of probabilities of the resulting states of the</u> <u>conclusion nodes;</u>

Visualization (referring to page 12, paragraph [69] of the present application) comprises a general act of presenting a visual representation of the evaluation results of the BN. In particular, a non-limiting example of the visualization step includes <u>generating</u> a complete graph for <u>failure</u> <u>probabilities for each sample</u> and generating two or three-dimensional matrices of averaged probabilities across all samples. The Applicants further refer the Examiner to page 14 paragraph [77] of the present application, where it teaches that a "computer system performs an act of outputting a representation of probabilities of the conclusion nodes states obtained during the diagnosing stage, and that there are many ways in which this data may be visualized."

The Applicants submit that "visualization" is fully disclosed by Claims 1, 18, 35, and 52, as follows: <u>outputting a representation of the plurality of</u> <u>the probabilities of the states of the conclusion nodes.</u>

Therefore, the Applicants submit: that by propagating known failures (desired conclusion states) down the dependency links to the evidence states; that by determining the probability of occurrence of the evidence states (probability of which symptoms more likely represent the failure); that by sampling the evidence states that are the "most likely states" to produce the failure and then setting the evidence states to these "most likely states" to produce the failure; that by then propagating this "most

likely states" (to produce the known failure) back up to the conclusion nodes and obtaining a plurality of probabilities of the resulting conclusion states (indicating whether or not the final conclusion states match the known propagated failure); and that by finally outputting a representation

5   of this plurality of probabilities of the states of the conclusion nodes, one skilled in the art can determine if a Bayesian network model is accurate or not by looking at the representation of the probabilities of the conclusion states outputted by Claims 1, 18, 35, and 52.

10   The Applicants emphasize that base Claims 1, 18, 35, and 52 clearly disclose a series of steps or acts that fully claim "failure propagation, diagnosis, and visualization" and that ultimately result on "outputting a representation of a plurality of the probabilities of the states of the conclusion nodes," wherein this resulting plurality of probabilities

15   stand alone on their own to evaluate Bayesian network models for decision support.

Because the Applicants firmly believe that the claims of the present invention, as currently written, disclose process acts, means, or

20   structural limitations that are able to stand alone on their own in order to automatically evaluate Bayesian network models for decision support, and that these claims do not depend on the preamble for completeness, for at least the reasons discussed above, the Applicants respectfully request that the Examiner withdraw this rejection of Claims 1,

25   18, 35, and 52 under 35 U.S.C. § 112 second paragraph.

Furthermore, the Applicants submit that Claims 2-17 are dependent upon Claim 1, Claims 19-34 are dependent upon Claim 18, Claims 36-51 are dependent upon Claim 35, and Claims 53-68 are dependent upon Claim

30   52. For the reasons given above, the Applicants submit that Claims 1, 18, 35, and 52 are patentable. Therefore, in addition to the reasons set forth

above, the Applicants submit that Claims 2-17, Claims 19-34, Claims 36-51, and Claims 53-68 are also patentable under 35 U.S.C. § 112 second paragraph at least based on their dependence upon an allowable base claim.

5

Claim Rejections – 35 USC § 102(a)

In section 2 of the current office action, the Examiner rejected Claims 1-68 under 35 U.S.C. § 102 (a) as being anticipated by Thompson et al. ("Evaluation of Bayesian Networks Used for Diagnostics," IEEE Aerospace Conference, March 2003, hereinafter

10   referred to as the "Thompson article").

Examiner's rejection of Claims 1, 18, 35, and 52

Regarding Claims 1, 18, 35, and 52, the Examiner stated that the Thompson article is directed to a method for automatically evaluating Bayesian network models for decision

15   support comprising receiving a Bayesian Network (BN) model (referring to Section 2.2 "Bayesian Network Models") including evidence nodes and conclusion nodes (referring to Section 2.2 "Bayesian Network Models" and Paragraph 6), where the conclusion nodes are linked with the evidence nodes by causal dependency links (referring to Figure 1), and where the evidence nodes have evidence states and the conclusion nodes

20   have conclusion states (referring to Section 2.2 "Bayesian Network Models" and Paragraph 6). The Examiner further stated that the "evidence nodes" in the instant application are analogous to the "observation nodes" in the prior art and that the "conclusion nodes" in the instant application are analogous to the "component nodes" in the prior art.

25

Furthermore, the Examiner stated that the Thompson article is directed to a method for automatically evaluating Bayesian network models for decision support comprising setting the states of the conclusion nodes to desired conclusion states (referring to Section 3.2, Paragraph 4, Steps 1 and 2) and determining, by propagating down the causal

30   dependency links, a corresponding probability of occurrence of evidence states of the evidence nodes (referring to Section 3.2 Paragraph 4, Steps 3.1-3.4) and producing from

the probability of occurrence, a plurality of samples of most likely states of the evidence nodes (referring to Section 3.2, Paragraph 4, Step 3).

5 The Examiner further stated that the Thompson article is directed to a method for automatically evaluating Bayesian network models for decision support comprising setting the states of the evidence nodes to states corresponding to the plurality of samples of the evidence states (referring to Section 3.2, Paragraph 6, Step 1), and propagating the evidence states back up the causal dependency links to the conclusion nodes, to obtain a plurality of probabilities of the resulting states of the conclusion nodes 10 (referring to Section 3.2, Paragraph 6, Step 2).

The Examiner also stated that the Thompson article is directed to a method for automatically evaluating Bayesian network models for decision support comprising outputting a representation of the plurality of the probabilities of the states of the 15 conclusion nodes (referring to Section 3.2, Paragraph 8).

Regarding Claims 18 and 35, the Examiner further stated that the Thompson article is directed to an apparatus for performing the above steps (referring to Section 4.4), specifically a Dell Dimension 8100 computer.
20

Regarding Claim 52, the Examiner stated that the Thompson article is directed to a computer program product for performing the above steps (referring to Section 4.4), specifically a Windows executable program.

25 **Regarding the rejections of Claims 1, 18, 35, and 52 over the Thompson article**

The Applicants submit **that the Thompson article is a conference paper that was published on the IEEE Aerospace Conference Proceedings, on March, 2003.** The Applicants further submit that the present invention was conceived prior to the publication date of the Thompson article. As
30 sworn to in the attached 37 CFR 1.131 declaration signed by the inventor,

the present invention was invented at least as early as March 4, 2002
(as evidenced by the Invention Disclosure, included therewith as
Appendix A) and was diligently pursued with the purpose of its reduction
to practice or until the priority filing date of October 23, 2003. Because
the present invention was invented at least as early as March 4, 2002, the
present invention was conceived prior to the publication date of the
Thompson article. **Thus, the Applicants believe that with the §1.131**
declaration, the Thompson article can no longer be considered prior
art with respect to the present invention.

Therefore, the Applicants respectfully request that the Examiner withdraw
this rejection under 35 U.S.C. § 102(a) and provide for timely allowance
of Claims 1-68.

Examiner's rejection of Claims 2, 19, 36, and 53

Regarding Claims 2, 19, 36, and 53, the Examiner stated that the Thompson article is
directed to automatically evaluating Bayesian network models for decision support,
wherein the BN model further includes at least one auxiliary node causally linked
between at least one evidence node and at least one conclusion node (referring to Section
2.2 "Bayesian Network Models" Paragraph 6).

Regarding the rejections of Claims 2, 19, 36, and 53 over the Thompson article

Regarding the Examiner's rejection of Claims 2, 19, 36, and 53, the
Applicants refer the Examiner to page 31 of this response.

Examiner's rejection of Claims 3, 20, 37, and 54

Regarding Claims 3, 20, 37, and 54, the Examiner stated that the Thompson article is
directed to automatically evaluating Bayesian network models for decision support,
wherein the sampling is performed by a Monte Carlo algorithm (referring to Section 3.2,
Paragraph 4, Step 3).

Regarding the rejections of Claims 3, 20, 37, and 54 over the Thompson article

Regarding the Examiner's rejection of Claims 3, 20, 37, and 54, the Applicants refer the Examiner to page 31 of this response.

5 **Examiner's rejection of Claims 4, 21, 38, and 55**

Regarding Claims 4, 21, 38, and 55, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the outputted representation is a complete representation of probabilities of states for all conclusions given a particular set of combinations of conclusion states (referring to

10 Section 4.1, Paragraph 1).

Regarding the rejections of Claims 4, 21, 38, and 55 over the Thompson article

Regarding the Examiner's rejection of Claims 4, 21, 38, and 55, the Applicants refer the Examiner to page 31 of this response.

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Examiner's rejection of Claims 5, 22, 39, and 56

Regarding Claims 5, 22, 39, and 56, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the outputted representation is a graphical representation (referring to Section 4.1

20 paragraph 1).

Regarding the rejections of Claims 5, 22, 39, and 56 over the Thompson article

Regarding the Examiner's rejection of Claims 5, 22, 39, and 56, the Applicants refer the Examiner to page 31 of this response.

25

Examiner's rejection of Claims 6, 23, 40, and 57

Regarding Claims 6, 23, 40, and 57, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the outputted representation is a matrix of averages of probabilities of the

30 conclusion states for implicated conclusions versus a selected set of combinations of conclusion states; whereby a user can determine an accuracy of the BN models

propensity to yield proper conclusions (referring to Section 3.2, Paragraph 8, and Section 4.2).

Regarding the rejections of Claims 6, 23, 40, and 57 over the Thompson article

5   Regarding the Examiner's rejection of Claims 6, 23, 40, and 57, the Applicants refer the Examiner to page 31 of this response.

Examiner's rejection of Claims 7, 24, 41, and 58

Regarding Claims 7, 24, 41, and 58, the Examiner stated that the Thompson article is

10   directed to automatically evaluating Bayesian network models for decision support, wherein the outputted representation is a graphical representation in the form of a two-dimensional intensity matrix and a three-dimensional bar chart (referring to Figure 4, Section 4.2, and Figure 5).

15   **Regarding the rejections of Claims 7, 24, 41, and 58 over the Thompson article**

       Regarding the Examiner's rejection of Claims 7, 24, 41, and 58, the Applicants refer the Examiner to page 31 of this response.

Examiner's rejection of Claims 8, 25, 42, and 59

20   Regarding Claims 8, 25, 42, and 59, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the conclusion nodes are weighted by weights representing their importance, and whereby the accuracy of the BN model's propensity to yield proper conclusions may be weighted for particular conclusions based on their relative importance (referring

25   to Section 3.2, Paragraph 7).

Regarding the rejections of Claims 8, 25, 42, and 59 over the Thompson article

       Regarding the Examiner's rejection of Claims 8, 25, 42, and 59, the Applicants refer the Examiner to page 31 of this response.

30

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Examiner's rejection of Claims 9, 26, 43, and 60

Regarding Claims 9, 26, 43, and 60, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the BN model models a diagnostic domain, with the conclusion nodes

5   representing component failures or diseases, the evidence nodes representing recognizable symptoms of those failures or diseases, and the auxiliary nodes representing additional information useful, in conjunction with the evidence nodes and conclusion nodes (referring to Section 2.2, Paragraph 6).

10   **Regarding the rejections of Claims 9, 26, 43, and 60 over the Thompson article**

        Regarding the Examiner's rejection of Claims 9, 26, 43, and 60, the Applicants refer the Examiner to page 31 of this response.

Examiner's rejection of Claims 10, 27, 44, and 61

15   Regarding Claims 10, 27, 44, and 61, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the BN model further includes at least one auxiliary node causally linked between at least one evidence node and at least one conclusion node (referring to Section 2.2, "Bayesian Network Models," Paragraph 6).

20

Regarding the rejections of Claims 10, 27, 44, and 61 over the Thompson article

        Regarding the Examiner's rejction of Claims 10, 27, 44, and 61, the Applicants refer the Examiner to page 31 of this response.

25   **Examiner's rejection of Claims 11, 28, 45, and 62**

Regarding Claims 11, 28, 45, and 62, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the sampling is performed by a Monte Carlo algorithm (referring to Section 3.2, Paragraph 4, and Step 3).

30

Regarding the rejections of Claims 11, 28, 45, and 62 over the Thompson article

Regarding the Examiner's rejection of Claims 11, 28, 45, and 62, the Applicants refer the Examiner to page 31 of this response.

5 **Examiner's rejection of Claims 12, 29, 46, and 63**

Regarding Claims 12, 29, 46, and 63, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the outputted representation is a complete representation of probabilities of states for all conclusions given a particular set of combinations of conclusion states

10 (referring to Section 4.1, Paragraph 1).

Regarding the rejections of Claims 12, 29, 46, and 63 over the Thompson article

Regarding the Examiner's rejection of Claims 12, 29, 46, and 63, the Applicants refer the Examiner to page 31 of this response.

15

Examiner's rejection of Claims 13, 30, 47, and 64

Regarding Claims 13, 30, 47, and 64, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the outputted representation is a graphical representation (referring to Section

20 4.1, Paragraph 1).

Regarding the rejections of Claims 13, 30, 47, and 64 over the Thompson article

Regarding the Examiner's rejection of Claims 13, 30, 47, and 64, the Applicants refer the Examiner to page 31 of this response.

25

Examiner's rejection of Claims 14, 31, 48, and 65

Regarding Claims 14, 31, 48, and 65, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the outputted representation is a matrix of averages of probabilities of the

30 conclusion states for implicated conclusions versus a selected set of combinations of conclusion states, and whereby a user can determine an accuracy of the BN models

propensity to yield proper conclusions (referring to Section 3.2, Paragraph 8, and Section 4.2).

Regarding the rejections of Claims 14, 31, 48, and 65 over the Thompson article

5   Regarding the Examiner's rejection of Claims 14, 31, 48, and 65, the Applicants refer the Examiner to page 31 of this response.

Examiner's rejection of Claims 15, 32, 49, and 66

Regarding Claims 15, 32, 49, and 66, the Examiner stated that the Thompson article is

10   directed to automatically evaluating Bayesian network models for decision support, wherein the outputted representation is a graphical representation in the form of a two-dimensional intensity matrix (referring to Figure 4) and a three-dimensional bar chart (referring to Figure 5).

Regarding the rejections of Claims 15, 32, 49, and 66 over the Thompson article

15   Regarding the Examiner's rejection of Claims 15, 32, 49, and 66, the Applicants refer the Examiner to page 31 of this response.

Examiner's rejection of Claims 16, 33, 50, and 67

20   Regarding Claims 16, 33, 50, and 67, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the conclusion nodes are weighted by weights representing their importance, whereby an accuracy of the BN model's propensity to yield proper conclusions may be weighted for particular conclusions based on their relative importance (referring to

25   Section 3.2, Paragraph 7).

Regarding the rejections of Claims 16, 33, 50, and 67 over the Thompson article

          Regarding the Examiner's rejection of Claims 16, 33, 50, and 67, the Applicants refer the Examiner to page 31 of this response.

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Examiner's rejection of Claims 17, 34, 51, and 68

Regarding Claims 17, 34, 51, and 68, the Examiner stated that the Thompson article is directed to automatically evaluating Bayesian network models for decision support, wherein the BN model models a diagnostic domain, with the conclusion nodes representing component failures or diseases, the evidence nodes representing recognizable

5   symptoms of those failures or diseases, and the auxiliary nodes representing additional information useful, in conjunction with the evidence nodes and conclusion nodes (referring to Section 2.2, Paragraph 6).

Regarding the rejections of Claims 17, 34, 51, and 68 over the Thompson article

10   Regarding the Examiners rejection of Claims 17, 34, 51, and 68, the Applicants refer the Examiner to page 31 of this response.

Regarding the rejections of Claims 2-17, 19-34, 36-51, and 53-68 over the Thompson article

15   The Applicants refer the Examiner to the comments above concerning the rejection of the base Claims 1, 18, 35, and 52 as being anticipated by the Thompson article. Because the Thompson article fails to teach all the elements of Claims 1, 18, 35, and 52, arranged exactly as in Claims 1, 18, 35, and 52, for reasons discussed above, the Applicants strongly believe

20   that Claims 1, 18, 35, and 52 are patentable over the prior art.

Furthermore, the Applicants submit that Claims 2-17 are dependent upon Claim 1, Claims 19-34 are dependent upon Claim 18, Claims 36-51 are dependent upon Claim 35, and Claims 53-68 are dependent upon Claim

25   52. For the reasons given above, the Applicants submit that Claims 1, 18, 35, and 52 are patentable. Therefore, in addition to the reasons set forth above, the Applicants submit that Claims 2-17, 19-34, 36-51, and 53-68 are also patentable under 35 U.S.C. § 102(a), at least based on their dependence upon an allowable base claim. Therefore, the Applicants

30   respectfully request that the Examiner withdraw this rejection.

Claim Rejections - 35 USC § 102(b)

In section 3 of the current office action, the Examiner rejected Claims 1, 2, 10, 16-19, 27, 33-36, 44, 50-53, 61, 67, and 68 under 35 U.S.C. § 102 (b) as being anticipated by Skaanning et al. (U.S. Publication No. 2001/0011260, hereinafter referred to as the

5   "Skaanning publication").

Examiner's rejection of Claims 1, 18, 35, and 52

Regarding Claims 1, 18, 35, and 52, the Examiner stated that the Skaanning publication is directed to a method for automatically evaluating Bayesian network models for decision

10   support comprising receiving a Bayesian Network (BN) model (referring to abstract) including evidence nodes (referring to Figure 7, nodes 520-530), and conclusion nodes (referring to Figure 7, node 500), where the conclusion nodes are linked with the evidence nodes by causal dependency links (referring to Figure 7, Paragraphs [0027] and [0186]), and where the evidence nodes have evidence states and the conclusion

15   nodes have conclusion states (referring to Paragraph [0013]). The Examiner further stated that the prior art discloses an automated diagnosis system that utilizes Bayesian networks to model a system component causing failure of a system. Furthermore, the Examiner stated that the term "conclusion node" in the instant application is interpreted to be analogous to the "indicator node" in the prior art.

20

Furthermore, the Examiner stated that the specification of the instant application states that the conclusion nodes are all the nodes that are representative of the system failures (referring to Paragraph [51] of the present invention). Then, the Examiner stated that the prior art discloses an indicator node that has a state that indicates whether the

25   system component is causing a failure (referring to Paragraph [0028]), and thus these nodes represent the failures of the system.

The Examiner further stated that the term "evidence node" in the instant application is interpreted to be analogous to the cause and diagnostic nodes in the prior art. As per

30   the specification of the instant application, the Examiner stated that the evidence nodes are all the nodes that model symptoms and test results (referring to Paragraph [51] of

the present invention). The Examiner further stated that the "cause node" in the prior art represents a cause of the system component producing a failure and each diagnostic step suggests an action to remedy causes represented by any cause node to which the diagnostic node is coupled.

5

Furthermore, the Examiner stated that the Skaanning publication teaches setting the states of the conclusion nodes to desired conclusion states (referring to Figure 4, Step 900, and Paragraph [0073]), and determining, by propagating down the causal dependency links, a corresponding probability of occurrence of evidence states of the

10 evidence nodes and producing, from the probability of occurrence, a plurality of samples of most likely states of the evidence nodes (referring to Figure 4, Step 907, and Paragraph [0108]).

In addition, the Examiner stated that the Skaanning publication teaches setting the states

15 of the evidence nodes to states corresponding to the plurality of samples of the evidence states (referring to Paragraph [0137]), and propagating the evidence states back up the causal dependency links to the conclusion nodes, to obtain a plurality of probabilities of the resulting states of the conclusion nodes (referring to Paragraphs [0133] to [0134]). The Examiner further stated that the Skaanning publication teaches outputting a

20 representation of the plurality of the probabilities of the states of the conclusion nodes (referring to Paragraph [0259]).

Regarding Claims 18, 35, and 52, The Examiner further stated that the Skaanning publication teaches an apparatus and computer program product for performing the

25 above steps (referring to Paragraph [0070]).

Regarding the rejections of Claims 1, 18, 35, and 52 over the Skaanning publication

Addressing the requirements of anticipation, the Federal Circuit stated that, "There must be no difference between the claimed invention and the

30 reference disclosure, as viewed by a person of ordinary skill in the field of the invention" *Scripps Clinic & Research Found. V. Genentech Inc., 927*

HRL1350OA1

F.2d 1576 (Fed. Cir. 1991). Furthermore, the Federal Circuit stated that "Anticipation requires that every element of the claims appear in a single reference ..." *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264 (Fed. Cir. 1991), and that "Anticipation requires the disclosure in a single

5 prior art reference of each element of the claim under consideration." *W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983). In addition, the Federal Circuit stated that under 35 U.S.C. § 102, "anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention,

10 arranged as in the claim" *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452 (Fed. Cir. 1984).

Therefore, in order to establish a prima facie case of anticipation, the Examiner must set forth an argument that provides (1) a single reference

15 (2) that teaches or enables (3) each of the claimed elements (as arranged in the claim) (4) either expressly or inherently and (5) as interpreted by one of ordinary skill in the art. All of these factors must be present or a case of anticipation is not met.

20 The Applicants submit that the Skaanning publication, in combination with the knowledge of one skilled in the art, does not teach, disclose, or suggest, expressly or inherently, all of the claimed limitations of Claims 1, 18, 35, and 52. More specifically, the Applicants submit that the **Skaanning publication does not suggest to "automatically evaluate**

25 **Bayesian network models** for decision support by setting the states of the conclusion nodes to desired conclusion states and determining, **by propagating down the causal dependency links**, a corresponding probability of occurrence of evidence states of the evidence nodes **and producing**, from the probability of occurrence, **a plurality of samples of**

30 **most likely states of the evidence nodes**; then by setting the states of the evidence nodes to states corresponding to the plurality of samples of the

evidence states, **and propagating the evidence states back up** the causal

dependency links to the conclusion nodes, **to obtain a plurality of**

probabilities of the resulting states of the conclusion nodes; **and by**

outputting a representation of the plurality of the probabilities of the

5   states of the conclusion nodes," as claimed by Claims 1, 18, 35, and 52.

The Applicants firmly believe that the Examiner has misinterpreted

the claimed subject matter of the present application and of the

Skaanning document, since the Skaanning document clearly discloses a

10   system for diagnosing a printer system by modeling the printer system

using a Bayesian network model. **The Applicants respectfully contend**

that Examiner has mistakenly equated this Skaanning's printer

diagnosing system with the present invention which automatically

evaluates Bayesian network models for accuracy.

15

The Applicants submit that the Skaanning document teaches the use of

"domain experts" to identify causes which lead to particular diagnoses of

failure for printer systems (referring to paragraphs [0025] to [0026],

[0073], and [0134]), and **uses this "domain expert" knowledge to create**

20   **the Bayesian network models for the printer systems,** as previously

stated by the Examiner. The Applicants refer the Examiner to paragraph

[0134] of the Skaanning document, where it is taught that the Skaanning's

diagnostic algorithms need the probability of the actions solving a problem

to be given previously by "domain experts," who have to answer for each

25   listed cause, what is the probability that performing the actions solves the

problem. The probabilities are then used to build the BN model

simulating the printer system and its potential failures. The Applicants

further submit that the Skaanning's diagnosing system is only as accurate

as the Bayesian network model used by the Skaanning's diagnosing

30   system to model the printer systems, and that if this BN model is

inaccurate, the Skaaning diagnosing system will fail. In addition, **the**

Applicants submit that the Skaanning publication does not disclose or suggest the use of a method for automatically evaluating the BN model previously generated by "domain experts" of the Skaanning publication. Therefore, the Applicants submit that the diagnosing system

5   taught by the Skaanning document requires a user interference (input) and "domain expert" knowledge to manually adjust or create the Bayesian Network models used by the Skaanning document. In contrast with the Skaanning document, the Applicants submit that the present invention is used to automatically (without a user's interference or input) evaluate the

10   accuracy of the BN models for decision support, such as the Skaaning's BN models which are created by direct "domain expert" interference and which are used to model printer systems.

The Applicants further submit that, in contrast with the Skaanning

15   document which discloses a "system for automated diagnosis of printer systems using Bayesian networks," (referring to the abstract of the Skaanning document, and paragraphs [0002], and [0025]-[0034]), the **present invention relates to a technique for predicting the accuracy of a BN model and determining what parameters may be providing**

20   **inaccuracies in the model either because of inaccurate modeling or because of real-world observations** (referring to pages 1 to 2, paragraphs [04] to [09] of the present invention). That is, the Applicants submit that the present invention is used to automatically (without a user's interference or input) evaluate the accuracy of Bayesian network models

25   for decision support, which have been previously created by "domain experts" such as the "Bayesian network model used by the Skaanning document to diagnose printer systems."

The Applicants submit that decision-support systems are computer

30   systems in which decisions, typically rendered by humans, are recommended and sometimes made (referring to pages 1 to 2, paragraphs

[04] to [09] of the present invention). Thus, computer scientists strive to create decision-support systems that are equivalent to or more accurate than a human expert. Bayesian networks (BN), known also as belief networks, are one example of a modeling technology on which decision-

5 support system can be based, such as the "Automated diagnosis of printer system method using Bayesian networks" disclosed by the Skaanning publication. The Applicants further submit that before BN models can be used in decision support aids, they have to be extensively evaluated, and that typical evaluation relies on comparing the answers suggested by the

10 BN models with those expected by the experts. The evaluation is generally limited to a relatively small number of decision cases, for which the experts know the correct answer. Therefore, a conventional evaluation of BN models is typically based on a limited ad-hoc testing, such as the BN model testing performed by the "domain experts" which is taught by

15 the Skaanning document (referring to paragraphs [0025] to [0034]). Such a conventional evaluation is almost always incomplete and therefore unreliable. Thus, what is needed is a systematic approach for evaluating the performance of a BN model. The present invention solves this need by providing a "method for automatically evaluating Bayesian network

20 models for decision support," as claimed by the present application in Claims 1, 18, 35, and 53.

The Applicants further emphasize that a technical problem faced by all of those who use BN in real-life decision support is that the BN models are

25 designed for critical decision support problems (e.g., diagnostics). The BN models are very complex and, as such, need to be very carefully evaluated before they can be used in practice (referring to page 3 paragraph [12] of the present application). Thus, the Applicants submit that to accomplish this evaluation task, an automated evaluation method,

30 such as the "method for automatically evaluating Bayesian network models for decision support" claimed by the present application, which

covers all the parts of the model and all the most probable decision cases, is needed.

5   In addition, **the Applicants submit that the Skaanning document is not an automatic method (such as the method claimed by the present application)**. Instead, the Skaanning document requires user intervention and input. The Applicants submit that the Skaanning document teaches that the **"Skaanning's diagnostic system" integrates programmatic data-collectors to improve the interactive gathering of data from the**

10   **customer, and thus query the customer for relevant data** that can be used in the BN model in order to speed up the diagnostic process (referring to paragraph [0034], [0073], and [0259]). In contrast with the Skaanning document which requires constant user input, the present invention automatically (without constantly querying the customer for

15   inputs) evaluates BN models by propagating down desired conclusion states and then propagating back up the most likely evidence states corresponding to the desired conclusion states. The present invention eventually outputs a representation of the plurality of the probabilities of the resulting states of the conclusion nodes.

20

The Applicants emphasize that the present invention does not use a BN model of a system (such as a printer) to diagnose the cause of the system's failures. Instead, the present application discloses a method and apparatus for **automatically** evaluating the accuracy of the BN models themselves

25   and not evaluating the performance of a system that these BN models represent (modeled).

Furthermore, the Applicants submit that paragraph [0137] of the Skaanning document does not teach or even suggest "setting the states of

30   the evidence nodes **to states corresponding to the plurality of samples of the evidence states**," as incorrectly suggested by the Examiner. The

Applicants submit that paragraphs [0133] to [0134] of the Skaanning document do not teach or even suggest **"propagating the evidence states back up the causal dependency links to the conclusion nodes, to** obtain a plurality of probabilities of the resulting states of the conclusion

5   nodes," as incorrectly suggested by the Examiner. The Applicants request that since the Skaanning document only propagates in one direction (referring to Figure 7), can the Examiner please identify where the Examiner finds the limitation of propagating down the causal dependency links and then propagating back up the causal dependency

10   links? The Applicants submit that paragraph [0259] of the Skaanning document does not teach or even suggest **"outputting a representation of the plurality of the probabilities of the states of the conclusion nodes,"** as incorrectly suggested by the Examiner. The Applicants submit that paragraph [0259] of the Skaanning document only discloses

15   "that a user interface guides the user to an identification of the problem that he is experiencing, where the diagnostic system first suggest either an action or a question to the user, and then the user responds to this queries." The Applicants further submit that there is not a single mention of **"outputting a representation of the plurality of the**

20   **probabilities of the states of the conclusion nodes"** anywhere in paragraph [0259] as previously suggested by the Examiner.

Thus, the Skaanning publication does not teach, disclose, or suggest to automatically evaluating Bayesian network models for decision support.

25   The Applicants respectfully <u>request that the Examiner indicate exactly</u> <u>where in the Skaanning publication the Examiner finds that the limitation</u> **"automatically evaluating Bayesian network models** for decision support; **propagating down desired conclusion states and then propagating back up the most likely evidence states corresponding to**

30   **the desired conclusion states;** obtaining a plurality of probabilities of the resulting states of the conclusion nodes; and eventually **outputting a**

representation of the plurality of the probabilities of the resulting states of the conclusion nodes," is taught, disclosed, or suggested.

Therefore, the Applicants submit that the Skaanning publication, in combination with the knowledge of one skilled in the art, does not teach, disclose, or suggest, expressly or inherently, all of the claimed limitations of Claims 1, 18, 35, and 52.

Because the Skaanning publication fails to teach all the elements of Claims 1, 18, 35, and 52, arranged exactly as in Claims 1, 18, 35, and 52, for reasons discussed above, the Applicants respectfully request that the Examiner withdraw this rejection under 35 U.S.C. § 102 (b) of Claims 1, 18, 35, and 52.

Examiner's rejection of Claims 2, 10, 19, 27, 36, 44, 53, and 61

Regarding Claims 2, 10, 19, 27, 36, 44, 53, and 61, the Examiner stated that the Skaanning publication teaches evaluating Bayesian network models for decision support, wherein the BN model further includes at least one auxiliary node (referring to Figure 7, node 501, and Paragraphs [0195] to [0199]) causally linked between at least one evidence node (referring to Figure 7 nodes 520-530) and at least one conclusion node (referring to Figure 7 node 500).

Regarding the rejections of Claims 2, 10, 19, 27, 36, 44, 53, and 61 over the Skaanning publication

Regarding the Examiner's rejection of Claims 2, 10, 19, 27, 36, 44, 53, and 61, the Applicants refer the Examiner to page 42 of this response.

Examiner's rejection of Claims 16, 33, 50, and 67

Regarding Claims 16, 33, 50, and 67, the Examiner stated that the Skaanning publication teaches automatically evaluating Bayesian network models for decision

support, wherein the conclusion nodes are weighted by weights representing their importance, and whereby the accuracy of the BN model's propensity to yield proper conclusions may be weighted for particular conclusions based on their relative importance (referring to Paragraphs [0148] to [0154]). The Examiner further stated that

5   the cost function is estimated using multiple factors (referring to Paragraph [0148]), such as risk (referring to Paragraph [0150]) and money (referring to Paragraph [0151]). Then, the Examiner stated that the factors are converted and are then balanced accordingly (weighted) and added (referring to Paragraph [0154]).

10   **Regarding the rejections of Claims 16, 33, 50, and 67 over the Skaanning publication**

Regarding the rejection of Claims 16, 33, 50, and 67, the Applicants refer the Examiner page 42 of this response.

15   **Examiner's rejection of Claims 17, 34, 51, and 68**

Regarding Claims 17, 34, 51, and 68, the Examiner stated that the Skaanning publication teaches automatically evaluating Bayesian network models for decision support, wherein the BN model models a diagnostic domain (referring to abstract) with the conclusion nodes representing component failures or diseases (referring to

20   Paragraph [0028]), the evidence nodes representing recognizable symptoms of those failures or diseases (referring to Paragraph [0028]), and the auxiliary nodes representing additional information useful in conjunction with the evidence nodes and conclusion nodes (referring to Figure 7, node 501, and referring to Paragraphs [0195] to [0199]).

25

Regarding the rejections of Claims 17, 34, 51, and 68 over the Skaanning publication

Regarding the rejection of Claims 17, 34, 51, and 68, the Applicants refer the Examiner to the comments immediately below.

30

Regarding the rejections of Claims 2-17, 19-34, 36-51, and 53-68 over the

Skaanning publication

The Applicants refer the Examiner to the comments above concerning the

rejection of the base Claims 1, 18, 35, and 52 as being anticipated by the

5   Skaanning publication. Because the Skaanning publication fails to teach

all the elements of Claims 1, 18, 35, and 52, arranged exactly as in Claims

1, 18, 35, and 52, for reasons discussed above, the Applicants strongly

believe that Claims 1, 18, 35, and 52 are patentable over the prior art.

10   Furthermore, the Applicants submit that Claims 2-17 are dependent upon

Claim 1, Claims 19-34 are dependent upon Claim 18, Claims 36-51 are

dependent upon Claim 35, and Claims 53-68 are dependent upon Claim

52. For the reasons given above, the Applicants submit that Claims 1, 18,

35, and 52 are patentable. Therefore, in addition to the reasons set forth

15   above, the Applicants submit that Claims 2, 10, 16-17, 19, 27, 33-34, 36,

44, 50-51, 53, 61, 67, and 68 are also patentable under 35 U.S.C. § 102(b),

at least based on their dependence upon an allowable base claim.

Therefore, the Applicants respectfully request that the Examiner withdraw

this rejection.

20

Claims Rejections - 35 USC§ 103(a)

Examiner's rejections of Claims 3-9, 11-15, 20-26, 28-32, 37-43, 45-49, 54-60, and 62-

66 over the Skaanning publication, in view of the Murphy thesis

In sections 5 of the current office action, the Examiner rejected Claims 3-9, 11-15, 20-26,

25   28-32, 37-43, 45-49, 54-60, and 62-66 under 35 U.S.C. § 103(a) as being unpatentable

over the Skaanning publication, in view of Murphy ("Dynamic Bayesian Networks

Representation, Inference, and Learning," herein referred to as the "Murphy thesis").

Examiner's rejection of Claims 3, 11, 20, 28, 37, 45, 54, and 62 over the Skaanning

30   **publication, in view of the Murphy thesis**

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Regarding Claims 3, 11, 20, 28, 37, 45, 54, and 62, the Examiner stated that the Skaanning publication does not disclose a method for automatically evaluating Bayesian network models for decision support, wherein the sampling is performed by a Monte Carlo algorithm. The Examiner further stated that the Murphy thesis teaches

5   performing Bayesian sampling using the Monte Carlo method (referring to the Murphy thesis Section 5.1 "introduction"). In addition, the Examiner stated that, at the time of the invention, it would have been obvious to one or more of ordinary skill in the art to combine the teachings of the Skaanning publication and the Murphy thesis because the Monte Carlo method is easy to implement, and the Monte Carlo method works on

10   almost any kind of model, and Monte Carlo method is guaranteed to give the exact answer (referring to the Murphy thesis Section 5.1, Paragraph 2).

Regarding the rejections of Claims 3, 11, 20, 28, 37, 45, 54, and 62 over the Skaanning publication, in view of the Murphy thesis

15   Regarding the Examiner's rejection of Claims 3, 11, 20, 28, 37, 45, 54, and 62, the Applicants refer the Examiner to page 49 of this response.

Examiner's rejection of Claims 4, 21, 38, and 55 over the Skaanning publication, in view of the Murphy thesis

20   Regarding Claims 4, 21, 38, and 55 the Examiner stated that the combination of the Skaanning publication and the Murphy thesis as applied to Claims 3, 20, 37, and 54 above teach an outputted representation that is a complete representation of probabilities of states for all conclusions given a particular set of combinations of conclusion states (referring to the Murphy thesis Figure 5.9).

25

Regarding the rejections of Claims 4, 21, 38, and 55 over the Skaanning publication, in view of the Murphy thesis

          Regarding the Examiner's rejection of Claims 4, 21, 38, and 55, the Applicants refer the Examiner to page 49 of this response.

30

Examiner's rejection of Claims 5, 22, 39, and 56 over the Skaanning publication, in view of the Murphy thesis

Regarding Claims 5, 22, 39, and 56 the Examiner stated that the combination of the Skaanning publication and the Murphy thesis as applied to Claims 4, 21, 38, and 55

5   above teach a graphical outputted representation (referring to the Murphy thesis Figure 5.9).

Regarding the rejections of Claims 5, 22, 39, and 56 over the Skaanning publication, in view of the Murphy thesis

10   Regarding the Examiner's rejection of Claims 5, 22, 39, and 56, the Applicants refer the Examiner to page 49 of this response.

Examiner's rejection of Claims 6, 23, 49, and 57 over the Skaanning publication, in view of the Murphy thesis

15   Regarding Claims 6, 23, 49, and 57 the Examiner stated that the combination of the Skaanning publication and the Murphy thesis as applied to Claims 4, 21, 38, and 55 above teaches automatically evaluating Bayesian network models for decision support, where the outputted representation is a matrix of averages of probabilities of the conclusion states for implicated conclusions versus a selected set of combinations of

20   conclusion states, whereby a user can determine an accuracy of the BN model's propensity to yield proper conclusions (referring to the Murphy thesis Page 176 first paragraph).

Regarding the rejections of Claims 6, 23, 49, and 57 over the Skaanning publication,
25   **in view of the Murphy thesis**

Regarding the Examiner's rejection of Claims 6, 23, 49, and 57, the Applicants refer the Examiner to page 49 of this response.

Examiner's rejection of Claims 7, 24, 41, and 58 over the Skaanning publication,
30   **in view of the Murphy thesis**

Regarding Claims 7, 24, 41, and 58 the Examiner stated that the combination of the Skaanning publication and the Murphy thesis as applied to Claims 6, 23, 40, and 57 above teaches automatically evaluating Bayesian network models for decision support, wherein the outputted representation is a graphical representation in the form

5 of a two-dimensional intensity matrix (referring to the Murphy thesis Figure 5.9), and a three-dimensional bar chart (referring to the Murphy thesis Figures 4.3 and 4.4)

Regarding the rejections of Claims 7, 24, 41, and 58 over the Skaanning publication, in view of the Murphy thesis

10   Regarding the Examiner's rejection of Claims 7, 24, 41, and 58, the Applicants refer the Examiner to page 49 of this response.

Examiner's rejection of Claims 8, 25, 42, and 59 over the Skaanning publication, in view of the Murphy thesis

15 Regarding Claims 8, 25, 42, and 59 the Examiner stated that the Skaanning publication is directed to a method for automatically evaluating Bayesian network models for decision support, wherein the conclusion nodes are weighted by weights representing their importance, and whereby the accuracy of the BN model's propensity to yield proper conclusions may be weighted for particular conclusions based on their relative

20 importance (referring to Paragraphs [0148] to [0154]). The Examiner further stated that the cost function is estimated using multiple factors (referring to Paragraph [0148]), such as risk (referring to Paragraph [0150]) and money (referring to Paragraph [0151]), and that the factors are converted and are then balanced accordingly (weighted) and added (referring to Paragraph [0154]).

25

Regarding the rejections of Claims 8, 25, 42, and 59 over the Skaanning publication, in view of the Murphy thesis

        Regarding the Examiner's rejection of Claims 8, 25, 42, and 59, the Applicants refer the Examiner to page 49 of this response.

30

Examiner's rejection of Claims 9, 26, 43, and 60 over the Skaanning publication, in view of the Murphy thesis

Regarding Claims 9, 26, 43, and 60 the Examiner stated that the Skaanning publication is directed to automatically evaluating Bayesian network models for decision support, wherein the BN model models a diagnostic domain (referring to the abstract), with the conclusion nodes representing component failures or diseases (referring to Paragraph [0028]), the evidence nodes representing recognizable symptoms of those failures or diseases (referring to Paragraph [0028]), and the auxiliary nodes representing additional information useful in conjunction with the evidence nodes and conclusion nodes (referring to Figures 7 and 8, and Paragraphs [0195] to [0199]).

Regarding the rejections of Claims 9, 26, 43, and 60 over the Skaanning publication, in view of the Murphy thesis

Regarding the Examiner's rejection of Claims 9, 26, 43, and 60, the Applicants refer the Examiner to page 49 of this response.

Examiner's rejection of Claims 12, 29, 46, and 63 over the Skaanning publication, in view of the Murphy thesis

Regarding Claims 12, 29, 46, and 63 the Examiner stated that the Skaanning publication does not disclose a method for automatically evaluating Bayesian network models for decision support, as set forth in Claim 1, wherein the outputted representation is a complete representation of probabilities of states for all conclusions given a particular set of combinations of conclusion states. The Examiner further stated that the Murphy thesis teaches an outputted representation that is a complete representation of probabilities of states for all conclusions given a particular set of combinations of conclusion states (referring to the Murphy thesis Figure 5.9). Then, the Examiner stated that, at the time of the invention, one of ordinary skill in the art would have obviously combined the teachings of the Skaanning publication and the Murphy thesis because the algorithm presented by the Murphy thesis can be performed in a short amount of time (referring to the Murphy thesis "Introduction").

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Regarding the rejections of Claims 12, 29, 46, and 63 over the Skaanning publication, in view of the Murphy thesis

Regarding the Examiner's rejection of Claims 12, 29, 46, and 63, the Applicants refer the Examiner to page 49 of this response.

5

Examiner's rejection of Claims 13, 30, 47, and 64 over the Skaanning publication, in view of the Murphy thesis

Regarding Claims 13, 30, 47, and 64 the Examiner stated that the Skaanning publication does not disclose a method for automatically evaluating Bayesian network

10   models for decision support as set forth in Claim 1, wherein the outputted representation is a graphical representation. The Examiner further stated that the Murphy thesis teaches a graphical outputted representation (referring to the Murphy thesis Figure 5.9). Furthermore, the Examiner stated that, at the time of the invention, one of ordinary skill in the art would have obviously combined the

15   teachings of the Skaanning publication and the Murphy thesis because the algorithm presented by the Murphy thesis can be performed in a short amount of time (referring to the Murphy thesis "Introduction").

Regarding the rejections of Claims 13, 30, 47, and 64 over the Skaanning

20   **publication, in view of the Murphy thesis**

Regarding the Examiner's rejection of Claims 13, 30, 47, and 64, the Applicants refer the Examiner to page 49 of this response.

Examiner's rejection of Claims 14, 31, 48, and 65 over the Skaanning publication,

25   **in view of the Murphy thesis**

Regarding Claims 14, 31, 48, and 65 the Examiner stated that the Skaanning publication does not disclose a method for automatically evaluating Bayesian network models for decision support as set forth in Claim 1, wherein the outputted representation is a matrix of averages of probabilities of the conclusion states for

30   implicated conclusions versus a selected set of combinations of conclusion states, and whereby a user can determine an accuracy of the BN model's propensity to yield

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conclusions. The Examiner further stated that the Murphy thesis teaches automatically

evaluating Bayesian network models for decision support, where the outputted

representation is a matrix of averages of probabilities of the conclusion states for

implicated conclusions versus a selected set of combinations of conclusion states, whereby

5   a user can determine an accuracy of the BN model's propensity to yield proper conclusions

(referring to the Murphy thesis Page 176, first paragraph). Furthermore, the Examiner

stated that, at the time of the invention, one of ordinary skill in the art would have

obviously combined the teachings of the Skaanning publication and the Murphy thesis

because the algorithm presented by Murphy can be performed in a short amount of time

10   (referring to the Murphy thesis "Introduction").

Regarding the rejections of Claims 14, 31, 48, and 65 over the Skaanning

publication, in view of the Murphy thesis

     Regarding the Examiner's rejection of Claims 14, 31, 48, and 65, the

15   Applicants refer the Examiner to page 49 of this response.

Examiner's rejection of Claims 15, 32, 49, and 66 over the Skaanning publication,

in view of the Murphy thesis

Regarding Claims 15, 32, 49, and 66 the Examiner stated that the Skaanning publication

20   does not disclose a method for automatically evaluating Bayesian network models for

decision support as set forth in Claim 1, wherein the outputted representation is a graphical

representation in the form of a two-dimensional intensity matrix and a three-dimensional

bar chart. The Examiner further stated that the Murphy thesis teaches automatically

evaluating Bayesian network models for decision support, wherein the outputted

25   representation is a graphical representation in the form of a two-dimensional intensity

matrix (referring to the Murphy thesis Figure 5.9), and a three-dimensional bar chart

(referring to the Murphy thesis Figures 4.3 and 4.4). Furthermore, the Examiner stated

that, at the time of the invention, one of ordinary skill in the art would have obviously

combined the teachings of the Skaanning publication and the Murphy thesis because the

30   algorithm presented by Murphy can be performed in a short amount of time (referring to

the Murphy thesis "Introduction").

Regarding the rejections of Claims 15, 32, 49, and 66 over the Skaanning publication, in view of the Murphy thesis

Regarding the Examiner's rejection of Claims 15, 32, 49, and 66, the

5   Applicants refer the Examiner to the comments immediately below.

Regarding the rejections of Claims 3-9, 11-15, 20-26, 28-32, 37-43, 45-49, 54-60, and 62-66 over the Skaanning publication, in view of the Murphy thesis

The Applicants refer the Examiner to the comments above concerning the

10   rejection of the base Claims 1, 18, 35, and 52 as being anticipated by the

Skaanning publication. Because the Skaanning publication fails to teach

all the elements of the base Claims 1, 18, 35, and 52, arranged exactly as

in Claims 1, 18, 35, and 52, for reasons discussed above, the Applicants

strongly believe that Claims 1, 18, 35, and 52 are patentable over the prior

15   art.

In addition, the Applicants submit that MPEP 2143.03 noted that to

establish a *prima facie* case of obviousness, all the claim limitations must

be taught or suggested by the prior art. The Applicants respectfully

20   submit that the combination of the Skaanning document with the Murphy

thesis does not teach all of the claim limitations of Claims 1, 18, 35, and

52. Specifically, **the Applicants assert that the combination does not**

teach, disclose, or suggest "automatically evaluating Bayesian

network models for decision support" as is claimed in Claims 1, 18, 35,

25   and 52.

For the reasons given above, **the Applicants submit that the combination of**

the Skaanning document with the Murphy thesis does not teach, or disclose,

or even suggest to **"automatically evaluating Bayesian network models for**

30   **decision support; propagating down desired conclusion states and then**

propagating back up the most likely evidence states corresponding to the

desired conclusion states; obtaining a plurality of probabilities of the resulting states of the conclusion nodes; and eventually **outputting a representation of the plurality of the probabilities of the resulting states of the conclusion nodes.**"

5

Therefore, the Applicants submit that the Skaanning document in combination with the Murphy thesis does not teach, disclose or suggest, expressly or inherently, all of the claimed limitations of the base Claims 1, 18, 35, and 52. For the foregoing reasons the Applicants believe that

10 Claims 1, 18, 35, and 52, as written, are patentable over the combination of prior art references.

Furthermore, the Applicants submit that Claims 2-17 are dependent upon Claim 1, Claims 19-34 are dependent upon Claim 18, Claims 36-51 are

15 dependent upon Claim 35, and Claims 53-68 are dependent upon Claim 52. For the reasons given above, the Applicants submit that Claims 1, 18, 35, and 52 are patentable. Therefore, in addition to the reasons set forth above, the Applicants submit that Claims 2-17, Claims 19-34, Claims 36-51, and Claims 53-68 are also patentable under 35 U.S.C. § 103(a), at least

20 based on their dependence upon an allowable base claim.

In addition, the Applicants submit that the **prior art references do not contain any suggestion or motivation, express or implied, that they be combined.** Therefore, the teachings of the references are not sufficient to

25 render claim 1 *prima facie* obvious. MPEP 706.02(j) states that the teaching or suggestion to make the claimed combination ... must be found in the prior art and not based on applicant's own disclosure. *In re Vaeck,* 947 F.2d 488 (Fed. Cir. 1991). The Applicants submit that the fact that "a computational method is easy to be implemented (such as the Monte

30 Carlo method)" is not enough motivation for two independent arts to be combined, without either of the prior arts actually suggesting to make the

claimed combination. The Applicants are unaware where in either the Skaanning publication or the Murphy thesis it is taught, disclosed, or suggested that the Monte Carlo method taught by the Murphy thesis should be implemented into the system taught by the Skaanning publication. The Applicants respectfully request that the Examiner indicate exactly where, in the prior art, the Examiner found the motivation to combine the references.

For reasons discussed above, the Applicants submit that the Skaanning publication, in combination with the Murphy thesis and the knowledge of one skilled in the art, does not teach, disclose, or suggest, expressly or inherently, all of the claimed limitations of Claims 3-9, 11-15, 20-26, 28-32, 37-43, 45-49, 54-60, and 62-66. Therefore, the Applicants respectfully request that the Examiner withdraw this rejection under 35 U.S.C. § 103(a) of Claims 3-9, 11-15, 20-26, 28-32, 37-43, 45-49, 54-60, and 62-66.

Closing Remarks:

The Applicants respectfully submit that, in light of the above amendments/remarks, the application and all pending claims are now in allowable condition. Therefore, reconsideration is respectfully requested. Accordingly, early allowance and issuance of
5   this application is respectfully requested.

Any claim amendments that are not specifically discussed in the above remarks are not made for patentability purposes, and it is believed that the claims would satisfy the statutory requirements for patentability without the entry of such amendments. Rather,
10   these amendments have only been made to increase claim readability, to improve grammar, and to reduce the time and effort required of those skilled in the art to clearly understand the scope of the claim language. Furthermore, any new claims presented above are of course intended to avoid the prior art, but are not intended as replacements or substitutes of any cancelled claims. They are simply additional specific statements of
15   inventive concepts described in the application as originally filed.

Further, it should be noted that amendment(s) to any claim is intended to comply with the requirements of the Office Action in order to elicit an early allowance, and is not intended to prejudice Applicant's rights or in any way to create an estoppel preventing
20   Applicant from arguing allowability of the originally filed claim in further off-spring applications.

In the event the Examiner wishes to discuss any aspect of this response, or believes that a conversation with either Applicant or Applicant's representative would be beneficial, the
25   Examiner is encouraged to contact the undersigned at the telephone number indicated below.

The Commissioner is authorized to charge any additional fees that may be required or credit overpayment to the attached credit card form. In particular, if this response is not
30   timely filed, the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of

the number of months necessary to make this response timely filed. The petition fee due

in connection therewith may be charged to deposit account no. 50-2738 if a credit card

form has not been included with this correspondence, or if the credit card could not be

charged.

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Respectfully submitted,

__1/8/2006__
Date

Cary Tope-McKay
Registration No. 41,350

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Cary Tope-McKay
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